National Aeronautics and Space Administration



AeroSpace FRONTIERS

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NASA Retires a

Research Workhorse

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Reengaging On-Site

As we transition to Stage 2, more personnel will be returning to their on-site workplaces. In many cases, it has been over a year since employees have been in a laboratory, a test facility, or an office. Should you be allowed to come on-site for any reason, please be cautious and re-familiarize yourself with your environment and any applicable processes and procedures. Although facility and safety inspections have continued during the pandemic and supervisors are conducting walkthroughs of all areas for Stage 2 readiness, the center depends on you to do your part. Ask yourself, is equipment in good, operating condition? Are operators current in their credentials? Is personal protective equipment available for your job? Are the safety permits current? Have required maintenance tasks been completed? We must all stay vigilant through this period of transition to stay healthy and safe at work.

AeroSpace Frontiers

is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the second Friday of each month by the Office of Communications in the interest of the Glenn workforce, retirees, government officials, business leaders, and the general public.

Submit short articles and calendar items to the editor at doreen.b.zudell@nasa.gov.

Editor: **Doreen B. Zudell**, ATS, 216–433–5317

Assistant Editor: **Adam Schabel,** ATS, 216–433–2888

Design: Rhys Sampson, ATS

Managing Editor: Kelly R. DiFrancesco

Circulation: **Angela Williams**, ATS, 216–433–8921

NASA Retires a Research Workhorse

When the U.S. Navy retired its fleet of S–3B Vikings from active duty in 2009, not all of them were grounded. At NASA Glenn, one S–3B was being used almost daily as a flight research aircraft. Acquired in 2004 and flown for the next 16 years on a variety of research missions, this S–3B Viking flew off into the sunset on July 14 to its retirement home at the San Diego Air and Space Museum in California. There it will be used to educate the public about its important role in the U.S. Navy and at NASA.

"This is the last S–3B flying today anywhere in the world," said Jim Demers, Glenn's Flight Operations manager. "It's been a workhorse for NASA, but we just can't source its unique parts anymore."

Originally designed by Lockheed Martin as an anti-submarine warfare aircraft, NASA's S–3B Viking was completely reconfigured in 2006 for flight research



GRC-2021-C-01954

Photo by Bridget Caswell

David Brennen, left, and Jose Gonzalez, Facilities, Test and Manufacturing, perform final preflight tests on one of the S–3B engines.



GRC-2021-C-01983 Photo by Bridget Caswell Stephen Hayes, Aircraft Operations, taxis the S–3B out of the Glenn Hangar.

purposes. All weapons systems were removed and replaced with civilian avionics, GPS, and satellite communications systems to conduct flight communications research.

One of its major contributions was helping NASA's aeronautical innovators define communications standards that the Federal Aviation Administration (FAA) can apply to the unmanned aircraft systems for safe operation in U.S. airspace.

"This old aircraft has been a huge part of ushering in the future of aviation," said Mike Jarrell, lead of NASA's e Command and Control project. "The S–3B has been a perfect match for our research. It has a nice flat bottom where we can mount a variety of antennae; it flies steady and goes low and slow so we can communicate with ground stations."

Jarrell adds that the S–3B has conducted research flights in every terrain in the national airspace including mountains, hills, over water, plains, and deserts. The results of the flight research have given NASA, the FAA, and its commercial partners a path to secure, reliable command-and-control radios used for communication from the ground to unmanned aircraft systems.

The S–3B also flew research flights to monitor algal bloom growth in Lake Erie and develop hyperspectral imaging equipment to provide more accurate data for university scientists studying the problem. The hyperspectral imagers, mounted to the aircraft's underbelly, analyze a wide spectrum of light to identify the types of harmful algal blooms in the water.

"The S–3B gave us the flexibility to fly at different altitudes to image large swaths of Lake Erie and other bodies of water," said Roger Tokars, an elliptical and optics engineer with NASA Glenn. "The other advantage was the aircraft's inertial navigation system that helped us calibrate our equipment for better geo-referencing data."

NASA's communications research in advanced air mobility will continue using a T–34 Mentor aircraft as new standards are developed to recommend to the FAA.

By Nancy Smith Kilkenny

GRC-2021-CN-00052

Photo by Rachel Johnston

Left to right: Demers; Jim Kidrick, president and CEO of the San Diego Air and Space Museum; and Alan Micklewright, former Viking pilot at Glenn, now assigned to NASA Headquarters, celebrate the landing of the S–3B in San Diego.

Fitting Final Flight

James "JD" Demers, chief of Aircraft Operations at Glenn, navigated NASA's S–3B Viking aircraft on its final flight on July 14. While with the Navy, Demers served as a research physicist and later as a naval aviator assigned to the S–3B. He landed S–3s on aircraft carriers and completed several significant missions. He led many research flights with NASA's S–3B over the past 15 years. It is most fitting that Demers was the last to pilot the final active S–3B.



Demers prepares the S–3B for its final flight.

GBC-2021-C-01992

Photo by Bridget Caswell r its final flight.

On the Cover:

Steven Hughell, Aerospace Operations Office, cleans the wind screens on the S–3B Viking in preparation for departure from Lewis Field.

> Photo by Bridget Caswell GRC-2021-C-01958



Robert Gibbs Visit Focuses on Mission Support Themes

NASA Glenn's senior leadership welcomed Robert Gibbs, associate administrator, Mission Support Directorate, for an in-person visit to the center from June 15 to 16. The visit included a series of meetings and tours to discuss Glenn's strategic and tactical mission support themes.

Gibbs visited both Lewis Field and Neil A. Armstrong Test Facility. Tour highlights included the Space Environments Complex, In-Space Propulsion Facility, Lewis Field high-voltage substations, Research Support Building, and Aerospace Communications Facility. Larry, Sivic, associate director; David Stringer, director, Neil A. Armstrong Test Facility; and Bryan Smith, director, Facilities Test and Manufacturing Division, served as escorts during Gibbs' visit.

"We focused on infrastructure and the overall status of mission support functions and capabilities," said Center Director Dr. Marla Pérez-Davis. "In addition, we shared our Future of Work efforts and its alignment with agency goals and objectives."

Gibbs is visiting all NASA centers to gain a better understanding of infrastructure status and future agency needs to successfully accomplish NASA objectives. Glenn was the second stop on his schedule.



GRC-2021-C-01654

Photo by Marvin Smith

Nuclear Power for Spaceflight Is Still Tried and True

Gibbs and Glenn staff view construction of the Aerospace Communications Facility at Lewis Field.

Six decades after the launch of the first nuclearpowered space mission, Transit IV–A, NASA is embarking on a bold future of human exploration and scientific discovery. This future builds on a proud history of safely launching and operating nuclear-powered missions in space.

"Nuclear power has opened the solar system to exploration, allowing us to observe and understand dark, distant planetary bodies that would otherwise be unreachable. And we're just getting started," said Dr. Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate. "Future nuclear power and propulsion systems will help revolutionize our understanding of the solar system and beyond and play a crucial role in enabling longterm human missions to the Moon and Mars."

Read about the past, present, and future of nuclear power as it relates to spaceflight, and how Radioscopic Power Systems fit in. Visit https:// go.nasa.gov/3AcKG9J.



Graphic by Gayle DiBiasio

Experiment Bound for Space Station Turns Down the Heat



GRC-2021-CN-00054 FBCE personnel conduct system checkout testing in July 2020. Left to right: George Saad (retired), Mark Sorrells, Phil Gonia, and Bob Dolesh.

A lot of power means a lot of heat.

NASA's future missions to explore the Moon and Mars will require enormous amounts of electrical power and hardware to support astronauts and drive new technologies. This increase in power, however, also increases the amount of heat generated—and then that heat needs to be removed so all the spacecraft systems can function.

To remove heat efficiently and reduce the mass of the cooling system, NASA is investigating new methods of transferring heat in space. One of the most effective methods for removing heat from its source is flow boiling, a two-phase process that uses the heat to boil a moving liquid until it changes it into a vapor and then flows that vapor away from the source.

The heat can also be transferred by changing a moving vapor back into a liquid in a process called flow condensation. Two-phase heat transfer systems, such as refrigerators, are very effective here on Earth, but more research is needed to understand how they will function in microgravity.

"Because a liquid/vapor mixture and interface behave differently in space, scientists need to investigate how boiling and condensation change in microgravity and obtain the data needed to apply what we've learned to design future heat transfer systems," said NASA Glenn Engineer Nancy Hall.

Hall is the project manager for the Flow Boiling and Condensation Experiment (FBCE), which is scheduled to launch to the International Space Station in August, aboard the Northrop Grumman Cygnus flight NG–16.

Built and tested at NASA Glenn by personnel from multiple organizations, FBCE will conduct a variety of experiments on the space station to investigate flow boiling and condensation in microgravity conditions. This research is a joint effort between Glenn and the Purdue University Boiling and Two-Phase Flow Laboratory.

"When it comes to microgravity condensation and flow boiling heat transfer, data and models are extremely limited," said Monica Guzik, FBCE chief engineer. "This experiment is critical to future NASA missions that require increased efficiency beyond the current single-phase systems."

The FBCE consists of seven boxes, or modules. These modules are connected by cables for data communication and electrical power. Five of the modules are connected with flexible hoses to allow circulation of the fluids upon final integration.

Once the hardware is on the space station, astronauts will integrate the FBCE into the Fluids and Combustion Facility Fluids Integrated Rack. After passing operational readiness reviews, FBCE is expected to become functional later this year. The experiment will then be operated and monitored by staff in Glenn's Telescience Support Center.

"Our team has dedicated 10 years to developing this experiment," said Hall. "FBCE is the first spaceflight hardware of this complexity built in-house at NASA Glenn in 20 years."

By Doreen B. Zudell



GRC-2019-C-03694 Photo by Bridget Caswell Jeff Mackey (left) and Guzik (right) perform engineering checks on the Fluid Module 1 prior to final hardware assembly in 2019.



STI Program Makes Publishing Simple

Sharing Scientific and Technical Information (STI) with a wide audience has never been easier. The Glenn STI Office provides authors with the necessary guidance to assist with the release of STI. The Scientific, Technical, and Research Information Discovery System (STRIVES) enables authors to gain approvals to release their STI via the NASA Form (NF) NF1676 approval form.

"By entering an STI into the STRIVES/NF1676 approval system, it goes through the approval process to avoid improper release of information," said Kimberly Schuetz, Glenn Document Availability Authorization Representative, Logistics and Technical Information Division. "The NASA STI Program also ensures STI is shared based on appropriate level of access and protects against the release of unclassified and restricted information to unauthorized requesters."

There are several benefits for authors who want to publish their work via the STI Program. Publishing STI can lead to an increased exposure of research to a national and international audience. It also archives documents to ensure knowledge preservation and avoids duplication of research. STI is available for viewing on the STI Repository/NASA Technical Reports Server (NTRS), Science.gov, the U.S. Government Publishing Office, and the National Technical Information Service. The agency STI Program office highlights research on social media to promote and encourage readership of work from various authors.

"The STI Program assists with making STI available to a wide audience," said Schuetz. "The program puts STI in a spotlight and enables work to be shared with others."

The Glenn STI Office is available to assist employees with using the STRIVES system. A video that provides more details about the NASA STI Program can be found here, https://www.youtube. com/watch?v=dkKrvFIAE5U. To learn more about the NASA STI Program, visit www.sti.nasa.gov.

By Adam Schabel

Design Challenge Helps Students Prepare for the Future

NASA Glenn's Office of STEM Education held a virtual event on June 17 to recognize its 2021 University Student Design Challenge winners.

"This year's design challenge brought together undergraduate students with diverse knowledge and backgrounds from across the country," said Darlene Walker, director of Glenn's Office of STEM Engagement. "They used their resourcefulness to contribute to NASA's mission while building crucial technical, communication, and team-building skills."

The challenges featured two space-themed projects:

- Space Challenge I—design a system that can perform science and exploration anywhere in the solar system with little to no modification to enable lower cost missions.
- Space Challenge II—develop a surface system capable of ground and atmospheric analysis of Venus while surviving on the surface for at least 90 Earth days.

Space Challenge I winner, AURORA, created a universal chassis with plug-and-play science instruments and mobility capabilities that could streamline robotic exploration across our solar system.

Team AURORA members are Dr. Craig Hardgrove, advisor; Nicole Swatton, Arizona State University, Tempe; Skye Rummer, University of California Merced; Ben Harte, Saint Mary's College of California Moraga; Delano Campos, University of California, Los Angeles; and Xavier Salcido, Washington University in St. Louis.

Space Challenge II winner, VICTRIX, from University of Texas at Austin, created a conceptual design for a suite of landers using the latest NASA technologies that could enable long-term Venus exploration in the near future. Members of VICTRIX are Rujing Zha, Zoelle Wong, Grace Calkins, Kaylee Champion, and their advisor, Adam Nokes.

"These students have shown that the future of space exploration will be in extremely capable hands as they take their place as aerospace leaders," said Glenn's Jeff Woytach, the team lead for this year's challenge.

By Jeannette Owens





AURORA

VICTRIX

Montreal

Peer Groups Help Virtual Glenn Interns Feel a Sense of Community

NASA Glenn's interns are helping one another stay connected this summer in the virtual work environment.

Under the Peer Leadership Program, interns are assigned to peer groups that meet weekly on Microsoft Teams to discuss professional and social topics. Each of the peer groups is headed by a peer leader, a fellow intern with at least one NASA internship under their belt. The groups include about 15 students each, are organized by time zone, and are composed of interns from a range of majors and academic levels.

"Because we're lonely in this virtual environment, this program is a breath of fresh air," said Tamsyn Brann, a peer leader and design and communication support intern for the Space Communications and Navigation Internship Project.

"The Office of STEM Engagement created peer groups because they were concerned that the interns would feel isolated as they were not at the center in person," internship coordinator Eric Hayes said. It also provides opportunities for interns to gain a degree of supervisory leadership. The program began last summer for the first virtual interns and has continued each subsequent session.

Erik Reep, a peer leader and Power and Propulsion Element systems safety intern, discusses career and research opportunities with his group. Victoria Blanc, a peer leader and Flow Boiling and Condensation Experiment intern, answers questions about intern assignments and plans to host guest speakers.

This time can also offer a break from a busy workday and give interns an opportunity to relax together.

Chatting about favorite video games, sports, or music has been a popular activity in Reep's group, while Brann organized an icebreaker where interns shared their favorite memes.

"We're all at NASA, so we might as well be friends," Brann said.ningh

Neoneela Boevets, a first-year Power and Propulsion Element systems safety intern, said she enjoys meeting with her peer group because it is the only time she interacts with anyone outside of her immediate team.

Meetings also provide interns with opportunities to talk openly about issues, without worrying about interns' mentors weighing in.

"NASA is a great place to work, but it can also be overwhelming for interns," Reep said. "Peer group is where we can discuss our mutual challenges."

Kahryn Buchanan, who is interning for the MATRICS project from her home in Alaska, appreciates that the other interns in her group are in her time zone. "It makes us feel a little bit closer," she said.

The peer leaders all believe in the program and want interns to benefit from the experience.

"I hope the peer groups can help everyone feel like they really belong at NASA," Blanc said.

By Ellen Bausback



Lauren Arkell Exeter, New Hampshire



Savanah Barnes East Lansing, Michigan



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Ellen Bausback Sarasota, Florida



Victoria Blanc, peer leader *Cleveland, Ohio*



Kalima Bukenya Harvard, Massachusetts



Jarred Carter Charleston, West Virginia





Sophia DeSisto Littleton, Massachusetts



Sarit Dhar *Toledo, Ohio*



James Casciano

Brunswick, Ohio

Nathan Dixon *Cleveland, Ohio* Samuel Dwyer Poland, Ohio

Tampa

Students pictured are from Peer Group 9.

Bausback, a University of Florida senior, is interning in the Office of Communications.

Photos were taken by interns with guidance from ITC photographer Bridget Caswell.

"Journey to Wellness" Focuses on Health and Wellness



Throughout the year, NASA's Office of the Chief Health and Medical Officer (OCHMO) offers information and resources on a selected topic or theme each month. On June 23, Mark Miller, a certified personal trainer, author, and nutritionist, discussed his perspectives on motivating men to enhance their well-being and identify ways to prevent health issues. Miller explained that getting an adequate amount of physical exercise, taking care of mental health, and scheduling regular medical exams are important steps toward optimal wellness. To learn more about this event and view previous "Journey to Wellness" presentations, visit https://go.nasa.gov/3Az99pP.

NEWS AND EVENTS

Network Helps Young Careerists Earn Their Wings



The NASA Aeronautics Early Career Network (ECN) held its virtual agencywide kickoff event "Finding Your Wings at NASA" on June 23. Emceed by Glenn's Dr. Jamesa Stokes, ECN lead, the event linked seasoned professionals with early career employees in Aeronautics Research Mission Directorate (ARMD) centers. In his keynote address, Robert Pierce, ARMD associate administrator, gave an overview of NASA Aeronautics and encouraged early career employees to become involved in the ARMD mission. The program included a panel discussion comprising senior leaders from each ARMD center who shared highlights of their path at NASA. Glenn early careerist Dr. Drew Ahern, participated in a question-and-answer session. For more information on the ECN, contact Dr. Stokes at jamesa.l.stokes@nasa.gov.

Program Provides Insight Into Eye Health

Glenn's Office of Diversity and Equal Opportunity and the Disability Awareness Advisory Group recently partnered with the Cleveland Sight Center to emphasize the importance of eye health. The "Vision Health Bad Habits, Blue Light and Why Nutrition Has Two Eyes" virtual event on June 24 provided tips for maintaining healthy eyesight. Representatives from the Cleveland Sight Center talked about the importance of incorporating Omega-3s and superfoods, such as eggs, tuna, salmon, and carrots, into your diet. They also stressed that limiting exposure to blue light emitted by electronic devices with screens—is another important step towards keeping our eyes healthy. Attendees may contact the Cleveland Sight Center for sight-related issues, if desired.



BPW Awards Two Scholarships

The NASA Glenn Business and Professional Women (BPW) recently awarded career advancement scholarships to two Alcyon Technical Services employees. Sandra Bennett, Advanced Aircraft Project Office, is working to convert her associate degree to a Bachelor of Science in Management and Technology in Business through Bowling Green State University's E-Campus. Jennifer Stefanov, Management Integration Division, is pursuing a Bachelor of Science in Physics with the goal of obtaining a master's degree in materials science.

The NASA BPW promotes full participation, equity, and economic self-sufficiency for working women. Educational programs, including scholarships, are an integral component of BPW's mission. Over the years, NASA BPW has provided over \$16,000 in scholarships to women at NASA Glenn. BPW is open to civil servants and support service contractors. For more information, contact Erline Trsek at setrsek@buckeye-express.com.



GRC-2021-CN-00047 Photos by Ann Schaft Scholarship recipient Bennett (left) with BPW President Trsek.



GRC-2020-CN-00046 Scholarship recipient Stefanov.

BPW Officers President: Erline Trsek Secretary: Marion Shields Treasurer: Mary Reveley

Pride Event Encourages Active Allyship

"The Power of Active Allyship at NASA" LGBTQ+ pride celebration event on June 17 highlighted the importance of active allyship in the workplace and in everyday life. LGBTQ+ employee resource groups across the agency, including Glenn's Rainbow Alliance Advisory Group, hosted the event. The panel included representatives from Glenn, including Charles Cockrell, associate director for Strategy; and Sarah Phillips, Logistics and Technical Information Division. Panel members discussed ways in which everyone can become an active ally, including advocating for an inclusive environment, and letting LGBTQ+ community members know that you care for and support them.



RETIREMENTS

Sandra Barrow, Institutional Resources Branch, Resource Analysis Division, Office of Chief Financial Officer, retired Jan. 2, 2021, with 39 years of NASA service.

MORE THAN A MEMORY



Dr. Dynys

Dr. Dynys Made Vast Contributions to Materials Science

Dr. Frederick W. Dynys, 64, a research materials engineer in the Materials Chemistry and Physics Branch, died on May 31.

During his 20-years at NASA, Dynys spearheaded development of advanced ceramic materials for a broad range of applications. He introduced for development new types of mechanically efficient materials that combined very low weight with high strength and stiffness. These novel materials are based on multiple hierarchies and unusual nanometer-scale size effects, which resulted in a new class of engineering materials with vastly superior properties. He received NASA Honor Awards in 2013 and 2014.

"Fred mentored dozens of graduate, undergraduate, and high school students," said Vadim Lvovich, supervisor. "He will be terribly missed by all of us at Glenn as an accomplished researcher and innovator, a dedicated mentor, and a truly exceptional colleague and friend."



Dr. Larkin

Dr. Larkin Loved His Work in Advancing Electronic Systems

Dr. David J. Larkin, 58, an electronics engineer in the Smart Sensing and Electronics Systems Branch, died on June 30.

During his 30 years at NASA, Dr. Larkin authored multiple publications and patents. He is best known for "site-competition epitaxy," which is a method for achieving superior control of compound semiconductor doping during crystal growth. Larkin also led the development of the Harsh Environment Nanotechnology Laboratory and its addition of a state-of-the-art facility and equipment. He received a Space Act Award (1995) and an Abe Silverstein medal (1996).

"David was passionate about research, being truly gifted in creating unique equipment to accomplish his research with a hands-on approach," said co-worker and friend Michael Lienhard. "I'll always remember him stating he never wished to retire—he couldn't imagine not doing something he loved. I will greatly miss David's enthusiasm, wisdom, and friendship."



Guthrie

Mary Lou Guthrie, 76, a 2007 retiree with 27 years of NASA service, died May 16. She helped coordinate contracting activities for the Small Business Innovation Research Program. Guthrie assisted with taking Bruce Shuman's Speedy Document Generation System and turning it into the Agency Integrated Drive Generator System, a document generation system for contracting personnel at all NASA centers. She was named NASA's MidRange/Commercial Program Person of the Year (2000). Guthrie retired as a procurement analyst in the Mission Support and Integration Division. Her son, Tony Herrmann, works in the Rotating and Drive Systems Branch.

Congratulations, NASA! Best Place to Work

For the ninth consecutive time, NASA has been named by the Partnership for Public Service as the Best Place to Work in Government, Large Agency. In addition, NASA ranked number 1 among large agencies for its response to the coronavirus pandemic, a category added for this past year.





11 a.m. to 2 p.m.



This year's event will feature special presentations, games and activities, and the Virtual Vehicle Show is returning! See Today@Glenn for more details on how to participate.

POC: Betsy Lavelle, 216-433-3198 or betsy.e.lavelle@nasa.gov



INFORMATION CAFÉ

On Wednesday, Aug. 18, from 11–11:45 a.m., the Glenn Library will host a mini lesson on "Data Literacy 102." Check Today@Glenn for the link.

POC: Robin Pertz, 3-5776

WOMEN'S EQUALITY DAY

Mark your calendar for Glenn's Women's Equality Day Event, taking place on Aug. 26, from 1:30–2:30 p.m. Check Today@Glenn for details.

POC: Ashley Cantor, 3–5159.

OUTDOOR SIREN TESTING

Emergency Management Office staff will conduct a mass notification voice test at building 15 on Wednesday, Sept. 1, at Lewis Field. An audible siren test will be conducted on the "tornado" tone on Saturday, Sept. 4.

POC: Allen Turner, 3–6826

VIRTUAL FACILITY TOURS

Glenn is hosting a virtual public tour season, featuring seven world-class facilities, through October. To learn more about the featured facilities, visit https:// www.nasa.gov/nasaglenntours. The next tour is Sept. 22, Zero-Gravity Research Facility. Registration opens 1 month before the tour date. Space is limited. Tell your friends and family!

POC: Debbie Lockhart, 3-8655

Deadline for the next calendar section is **Wednesday, Aug. 18, noon**. News and feature stories require additional time.

NASA Glenn Employees: For more calendar information, visit https://wing.grc.nasa.gov/event-calendar/.

National Aeronautics and Space Administration

John H. Glenn Research Center

Lewis Field 21000 Brookpark Road Cleveland, Ohio 44135

Neil A. Armstrong Test Facility 3597 E. Scheid Road Sandusky, Ohio 44870

www.nasa.gov

Read AeroSpace Frontiers online at https://www.nasa.gov/glenn/aerospacefrontiers.

Celebrating 80 Years Looking Back Through the Decades



John Glenn speaks during the renaming ceremony in 1999. U.S. Sen. Mike DeWine and Center Director Dr. Donald Campbell are pictured next to Glenn. NASA Glenn was originally established in 1941 as the Aircraft Engine Research Laboratory (AERL), part of the National Advisory Committee for Aeronautics (NACA). The laboratory became a national resource for innovations in aircraft engine technology that transformed commercial and military propulsion systems.

Over the decades, NASA's Cleveland-based scientists and engineers advanced technology in both aviation and space exploration, propelling the U.S. into a leading role in the aerospace industry.

A New Name: 1990s

The Center continues its leading aeropropulsion, space power, and space propulsion work. Lewis assumes a lead role in the microgravity program as the program manager for Fluid Physics and Combustion Microgravity Research.

On March 1, 1999, the Lewis Research Center was officially renamed the NASA John H. Glenn Research Center at Lewis Field. The name change was celebrated with a full day of festivities on May 7, 1999.

Emergency and Inclement Weather Lines

Lewis Field: 216–433–9328 (WEAT) Neil A. Armstrong Test Facility: 419–621–3333

